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Office Memorandum • UNITED STATES GOVERNMENT

TO : Chief, Design Unit, R&D Laboratory

DATE: 12 March 1957

FROM :

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SUBJECT: Manufacture of Miniature Variable Capacitor

1. I was requested to investigate what would be involved to manufacture variable capacitors in the Mechanical Laboratory similar to the engineering model supplied us by , Los Angeles, California. The capacity range at room temperature is 1.8 uuf to 180 uuf for the capacitor. Its physical dimensions, exclusive of the shaft extension, are 3/4" x 5/8" x 1/4". It is of a conventional design with a fixed stator and rotating armature, and uses .0025" thick Teflon as a dielectric. The capacitor is designed for linear capacitance values through its range.

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2. The Mechanical Laboratory will be required to make punch and dies for the laminations and spacers, one punch and die for the rotor laminations, one for the stator laminations, one for the dielectric laminations, and one or two for the various spacer washers. The plastic end plates can be either punched or machined.

3. The dies for these parts will require .0002" to .0005" clearance between the punch and die to minimize punching burrs.

4. The tooling time will be estimated separately from the actual fabrication time for the capacitor.

Tooling Time

Punch and die for rotor laminations - 120 hrs.

Punch and die for stator laminations - 120 hrs.

Punch and die for dielectric laminations - 100 hrs.

Punch and die for spacer washers - 20 hrs.

*Drill jig for end plates - 20 hrs.

*Punch and die for end plates - 60 hrs.

*Optional tooling.

Fabrication time/capacitor - 6 hrs.

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NO CHANGE IN CLASS. ☐☐ DECLASSIFIED

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~~SECRET~~

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Notes on CV-1

Providing an adequate knob for the tuning control points up a difficulty long inherent in the CV-1 program. The Erie Ceramic, variable capacitor, has been justified in the past only from the standpoint of size. The long term mechanical and electrical stability of this unit under more than occasional use (this unit is essentially a trimmer capacitor) has been in doubt. It has been our experience (Project Friday) that even when the unit is provided with a shaft and front bearing the flimsy mechanical construction soon breaks down. The amount of side thrust which the rotating element can withstand is well below a reasonable safety margin when any knob protruding above the case is used. Moreover, when this capacitor is modified for CV-1 (^{recessed} ~~discontinued~~) a failure rate of almost 100% is encountered.

A small variable capacitor utilizing Teflon dielectric material has been tested in the Laboratory. This sample unit was built by and is similar in construction to the German variable mica used in the TA-1 transmitter. No major difficulty is foreseen in its adaption to the CV-1 providing we can get them made in reasonable quantity. The shaft of this condenser can be provided with a knob which will best suit our purpose. The unit also opens up the possibility of increasing the tuning range of the CV-1 up to 12 mcs since the minimum capacity is held below that of Erie ceramic while the maximum represents a 4:1 increase.

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A third unit of the CV-1 is being held in the Laboratory as a production prototype. A circuit modification has been initiated which will prevent destruction of the transistors if the battery polarity is reversed. This change will necessitate revamping of the printed circuit board.

In the light of these changes it is suggested that the final CV-1 manufacturing drawings be held in abeyance until additional information is available on the capacitor and it is confirmed as to the extent of the CV-1 upper frequency limit. The latter may remove the requirement for the construction of the 6 to 12 mc CV-2 version.

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